REMARKS

The Office Action dated August 9, 2007 has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

Claims 1-3, 7-10, 12-15, and 17-18 have been amended to more particularly point out and distinctly claim the subject matter of the invention. No new matter has been added. Therefore, claims 1-18 are currently pending in the application and are respectfully submitted for consideration.

Applicants wish to thank the Examiner for the withdrawal of the rejections under 35 U.S.C. § 112, second paragraph.

The Office Action rejected claims 2, 8, 13, and 17-18 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,370,380 ("Norefors"). The rejection is respectfully traversed for at least the following reasons.

Claim 2 recites a method of validating information of a mobile node within a candidate access router discovery procedure in a mobile internet protocol environment. The method includes generating a token by a first access router to which the mobile node was previously attached. The method further includes sending the token from the first access router to the mobile node within a message comprising a list of candidate access routers. The method further includes sending the token from the mobile node to a second access router as selected candidate after a handover procedure between the first and second access routers. The method further includes sending the token within an

exchange between the access routers specific to the discovery procedure from the second access router back to the first access router for verification.

Claim 8 recites a system for validating information of a mobile node within a candidate access router discovery procedure in a mobile internet protocol environment. The system includes a first access router, the mobile node, and a second access router. The first access router includes a generating unit configured to generate a token, and first sending unit configured to send the token to the mobile node within a message comprising a list of candidate access routers. The mobile node includes a second sending unit configured to send the token to the second access router as selected candidate after a handover procedure between the access routers. The second access router includes a third sending unit configured to send the token within an exchange between the access routers specific to the discovery procedure back to the first access router and a verification unit configured to verify the token.

Claim 13 recites an access router for validating information of a mobile node in a mobile internet protocol. The access router includes a generating unit configured to generate a token. The access router further includes a first sending unit configured to send the token to the mobile node within a message comprising a list of candidate access routers. The access router further includes a second sending unit configured to send the token within an exchange with another access router specific to the discovery procedure to the other access router. The access router further includes a verification unit configured to verify the token.

Claim 17 recites a system for validating information of a mobile node within a candidate access router discovery procedure in a mobile internet protocol environment. The system includes a first access router, the mobile node and a second access router. The first access router includes generating means for generating a token, and first sending means for sending the token to the mobile node within a message comprising a list of candidate access routers. The mobile node includes second sending means for sending the token to the second access router as selected candidate after a handover procedure between the access routers. The second access router includes third sending means for sending the token within an exchange between the access routers specific to the discovery procedure back to the first access router and verification means for verifying the token.

Claim 18 recites an apparatus for validating information of a mobile node in a mobile internet protocol. The apparatus includes generating means for generating a token. The apparatus further includes first sending means for sending the token to the mobile node within a message comprising a list of candidate access routers. The apparatus further includes second sending means for sending the token within an exchange with another access router specific to the discovery procedure to the other access router. The apparatus further includes verification means for verifying the token.

Thus, according to embodiments of the invention, denial-of-service attacks can be reduced while implementing a Candidate Access Router Discovery ("CARD") protocol. Specifically, according to embodiments of the invention, a smart cache replacement policy is employed to ensure that valid cache entries are given highest priority and that

information gathered from locally connected mobile terminals is favored, which inherently diminishes the effect of a distributed denial-of-service attack.

As will be discussed below, Norefors fails to disclose or suggest all of the elements of the claims, and therefore fails to provide the advantages and features discussed above.

Norefors generally describes, in a mobile, wireless telecommunication network, a method for achieving secure handover of a mobile terminal from a first access point to a second access point, wherein the first access point and the second access point are physically connected through a fixed network. Norefors generally describes that this is accomplished by transmitting a security token from the first access point to the mobile terminal, and then from the mobile terminal to the second access point, over the radio interface.

Applicants respectfully submit that Norefors fails to disclose, teach, or suggest, all of the elements of the present claims. Norefors does not disclose, teach, or suggest, at least, "generating a token by a first access router to which the mobile node was previously attached;" "sending the token from the first access router to the mobile node within a message comprising a list of candidate access routers;" "sending the token from the mobile node to a second access router as selected candidate after a handover procedure between the first and second access routers;" and "sending the token within an exchange between the access routers specific to the discovery procedure from the second access router back to the first access router for verification," as recited in claim 2.

Norefors also does not disclose, teach, or suggest, at least, "a first access router;" "said mobile node and a second access router;" "wherein, the first access router includes a generating unit configured to generate a token, first sending unit configured to send the token to the mobile node within a message comprising a list of candidate access routers;" "wherein the mobile node includes second sending unit configured to send the token to the second access router as selected candidate after a handover procedure between the access routers;" and "wherein the second access router includes a third sending unit configured to send the token within an exchange between the access routers specific to the discovery procedure back to the first access router and a verification unit configured to verify the token," as recited in claim 8 and similarly recited in claim 17. Norefors also does not disclose, teach, or suggest, at least, "an access router for validating information of a mobile node in a mobile internet protocol;" "a first sending unit configured to send the token to the mobile node within a message comprising a list of candidate access routers;" and "a second sending unit configured to send the token within an exchange with another access router specific to the discovery procedure to the other access router," as recited in claim 13 and similarly recited in claim 18.

Norefors discloses a wireless network which includes a number of fixed radio stations which Norefors identifies as "base stations" or "access points" (column 1, lines 10-18). The Office Action takes the position that by disclosing such an access point, Norefors discloses an "access router" as recited in claims 2, 8, 13, and 17-18. Applicants

respectfully submit that Norefors' access points do not disclose an "access router" as recited in claims 2, 8, 13, and 17-18.

At paragraph 0059, the specification of the present application states the following: "[t]he term 'access router' should be understood to include computer-implemented devices that route packets, such as IP packets, to addresses in a network based on routing information. However, it should be understood that access routers are distinct from base stations/access points, which may rely on different transmission schemes to transmit information (e.g. GSM or CDMA). One or more base stations could be associated with a single access router, as shown in FIG. 1. Alternatively, more than one access router could be associated with a single base station." Thus, the specification of the present invention makes clear that a base station or an access point is distinct from an "access router" as recited in claims 2, 8, 13, and 17-18.

In contrast, as described above, Norefors merely discloses a method for a secure handover between access points to a wireless network. As described above, Norefors discloses that Norefors' fixed network portion of a wireless network is connected to a number of fixed radio stations known as base stations or access points. Norefors further discloses a technique for securing communications for a mobile terminal during a handover procedure from a first access point to a second access point. Nowhere does Norefors disclose an access router, a plurality of access routers, or a handover procedure from a first access router to a second access router. Furthermore, as discussed above, an "access router" in the present invention can consist of a plurality of access points. Yet,

Norefors does not disclose a handover procedure from a plurality of access points to a second plurality of access points; Norefors merely discloses a handover from a single access point to another single access point. Accordingly, Applicants respectfully submit that Norefors fails to disclose any such feature involving an access router. Such considerations are simply not made by Norefors.

Therefore, Applicants respectfully assert that Norefors fails to disclose, teach, or suggest, at least, an "access router" as recited in claims 2, 8, 13, and 17-18. Furthermore, because Norefors fails to disclose, teach, or suggest an "access router," Applicants respectfully assert that Norefors fails to disclose, teach, or suggest, at least "generating a token by a first access router to which the mobile node was previously attached," "sending the token from the first access router to the mobile node within a message comprising a list of candidate access routers," "sending the token from the mobile node to a second access router as selected candidate after a handover procedure between the first and second access routers," and "sending the token within an exchange between the access routers specific to the discovery procedure from the second access router back to the first access router for verification," as recited in claim 2; "a first access router," "said mobile node and a second access router," "wherein, the first access router includes a generating unit configured to generate a token, first sending unit configured to send the token to the mobile node within a message comprising a list of candidate access routers," "wherein the mobile node includes second sending unit configured to send the token to the second access router as selected candidate after a handover procedure

between the access routers," and "wherein the second access router includes a third sending unit configured to send the token within an exchange between the access routers specific to the discovery procedure back to the first access router and a verification unit configured to verify the token," as recited in claim 8 and similarly recited in claim 17; "an access router for validating information of a mobile node in a mobile internet protocol," "a first sending unit configured to send the token to the mobile node within a message comprising a list of candidate access routers," and "a second sending unit configured to send the token within an exchange with another access router specific to the discovery procedure to the other access router," as recited in claim 13 and similarly recited in claim 18.

For at least all the reasons discussed above, Norefors does not disclose, teach, or suggest, all of the elements of claims 2, 8, 13, and 17-18.

The Office Action rejected claims 1, 3-5, 7, 9-10, 12, and 14-16 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,137,791 ("Frid") in view of Norefors. The rejection is respectfully traversed for at least the following reasons.

Claim 1, upon which claims 3-6 are dependent, recites a method of reducing denial-of-service attacks by malicious mobile nodes in a mobile internet protocol (IP) environment. The method includes maintaining, by each of a plurality of access routers within the mobile IP environment, a cache of neighboring access routers as candidates and their associated access points. The method further includes populating the caches with cache entries in response to actions initiated by mobile nodes. Each cache entry is

tagged with an identity of an action initiating mobile node, which identity is based on information that is verifiable by the access routers and which cannot be modified arbitrarily by the mobile node. A total number of entries that can be tagged and thus introduced into a cache by any given node is limited.

Claim 7, upon which claims 9-11 are dependent, recites a system for reducing denial-of-service attacks by malicious mobile nodes in a mobile internet protocol (IP) environment. The system includes a plurality of access routers within the mobile IP environment, each router configured to maintain a cache of neighboring access routers as candidates and their associated access points. The system further includes a plurality of mobile nodes which are capable of populating the caches in response to actions initiated. The cache is configured such that each cache entry is tagged with an identity of the action initiating mobile node having thus created the entry, and that a total number of entries that can be tagged and thus introduced into the cache by any given node is limited.

Claim 12, upon which claims 14-16 are dependent, recites an access router for reducing denial-of-service attacks by malicious mobile nodes in a mobile internet protocol. The access router includes a cache of neighboring access routers as candidates and their associated access points. The cache is arranged such that each cache entry is tagged with the identity of the mobile node having initiated the entry creation, and that the total number of entries that can be tagged and thus introduced into the cache by any given node is limited.

The discussion of Norefors is incorporated herein. Frid generally describes a roaming mechanism enabling a mobile station to roam between a first data packet network utilizing a Mobile IP Method (MIM) and a second data packet network utilizing a Personal Digital Cellular Mobility Method (PMM) is disclosed. In Frid, a foreign agent is introduced into the PMM network for enabling a mobile station associated with the MIM network and currently roaming within the PMM network to communicate packet data with an associated home agent. A home agent is further introduced into the PMM network for enabling a mobile station associated with the PMM network and currently roaming within the MIM network to communicate packet data with an associated foreign agent or Mobile IP Client Emulator (MICE) currently serving the roaming mobile station.

The Office Action took the position that Frid discloses all the elements of claims 1, 7, and 12, except "maintaining, by each of a plurality of access routers within the mobile IP environment, a cache of neighboring access routers as candidates and their associated access points," as recited in claim 1; "a plurality of access routers within the mobile IP environment, each router maintaining a cache of neighboring access routers as candidates and their associated access points," as recited in claim 7; and "a cache of neighboring access routers as candidates and their associated access points," as recited in claim 12. The Office Action further took the position that Norefors cures the deficiencies of Frid and that "it would have been obvious to a person skilled in the art at the time the invention was made to incorporate the teaching of Norefors ... into the teaching of Frid ... in order to protect the system against intruders."

Applicants respectfully submit that Frid and Norefors, whether considered alone or in combination, fail to disclose, teach or suggest, all of the elements of the present claims. The combination of Frid and Norefors fails to disclose, teach or suggest, at least, "maintaining, by each of a plurality of access routers within the mobile IP environment, a cache of neighboring access routers as candidates and their associated access points," as recited in claim 1; "a plurality of access routers within the mobile IP environment, each router maintaining a cache of neighboring access routers as candidates and their associated access points," as recited in claim 7; and "a cache of neighboring access routers as candidates and their associated access points," as recited in claim 12.

In the context of embodiments of the present invention, two access routers are considered neighbors if the access routers have associated base stations with overlapping coverage areas (Specification, paragraph 0009). As the Office Action correctly realizes, Frid fails to disclose, teach, or suggest at least "maintaining, by each of a plurality of access routers within the mobile IP environment, a cache of neighboring access routers as candidates and their associated access points," as recited in claim 1; "a plurality of access routers within the mobile IP environment, each router maintaining a cache of neighboring access routers as candidates and their associated access points," as recited in claim 7; and "a cache of neighboring access routers as candidates and their associated access points," as recited in claim 12 because Frid fails to disclose, teach, or suggest "a plurality of access routers" and "neighboring access routers." Instead, Frid discloses a plurality of base stations which provide radio coverage over a plurality of geographic areas, where a

particular base station connects to an associated visited mobile switching center for routing and processing communicated data (column 4, lines 14-18). Frid further discloses that whenever a particular mobile station travels into a particular geographic area, a base station serving that geographic area transmits identification data informing the mobile station of the current location, and that based on said identification data, the mobile station registers with a new visited mobile switching center (column 4, lines 28-36). However, Frid fails to disclose associated visited mobile switching centers that have associated base stations with overlapping coverage areas. Thus, Frid fails to disclose, teach, or suggest, "neighboring access routers" and thus, fails to disclose, teach or suggest, at least, "maintaining, by each of a plurality of access routers within the mobile IP environment, a cache of neighboring access routers as candidates and their associated access points," as recited in claim 1; "a plurality of access routers within the mobile IP environment, each router maintaining a cache of neighboring access routers as candidates and their associated access points," as recited in claim 7; and "a cache of neighboring access routers as candidates and their associated access points," as recited in claim 12.

Furthermore, Norefors fails to cure the deficiencies of Frid. As describe above, Norefors fails to disclose, teach, or suggest, an "access router" as recited in the present claims, because Norefors discloses base stations, or access points, which are distinct from "access routers." Thus, for similar reasons why Norefors fails to disclose, teach, or suggest "access router" in the present claims, Norefors fails to disclose, teach, or suggest "neighboring access routers" as recited in claims 1, 7, and 12. Therefore, because the

combination of Frid and Norefors fails to disclose, teach, or suggest "neighboring access routers," the combination of Frid and Norefors fails to disclose, teach or suggest, at least, "maintaining, by each of a plurality of access routers within the mobile IP environment, a cache of neighboring access routers as candidates and their associated access points," as recited in claim 1; "a plurality of access routers within the mobile IP environment, each router maintaining a cache of neighboring access routers as candidates and their associated access points," as recited in claim 7; and "a cache of neighboring access routers as candidates and their associated access points," as recited in claim 12.

For at least all the reasons discussed above, the combination of Frid and Norefors does not disclose, teach, or suggest, all of the elements of claims 1, 7, and 12.

Claims 3-5, 9-10, and 14-16 are dependent upon claims 1, 7, and 12, respectively. Accordingly, claims 3-5, 9-10, and 14-16 should be allowed for at least their dependence upon claims 1, 7, and 12, and for the specific limitations recited therein.

In a previous Office Action, dated February 9, 2007 ("Previous Office Action"), claims 6 and 11 were objected to as being dependent upon a rejected base claim. The Previous Office Action also indicated that claims 6 and 11 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The current Office Action does not discuss claims 6 and 11. Thus, Applicants presume that the current Office Action also objects to claims 6 and 11 as being dependent upon a rejected base claim, but indicates that claims 6 and 11 would be allowable if rewritten in independent form including all of the limitations of the base

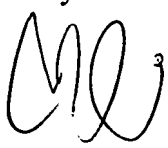
claim and any intervening claims. If Applicants' presumption is incorrect, then Applicants respectfully request that the Examiner issue a new non-final Office Action detailing the status of claims 6 and 11. Applicants further assert that claims 6 and 11 have not been amended to rewrite the claims in independent form including all of the limitations of the base claims and any intervening claims, because Applicants have addressed the formal rejections to the independent claims, which claims 6 and 11 depends from, above. Accordingly, it is respectfully requested that claims 6 and 11 be allowed.

For at least the reasons discussed above, Applicants respectfully submit that the cited prior art references fails to disclose or suggest all of the elements of the claimed invention. These distinctions are more than sufficient to render the claimed invention unanticipated and unobvious. It is therefore respectfully requested that all of claims 1-18 be allowed, and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,



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